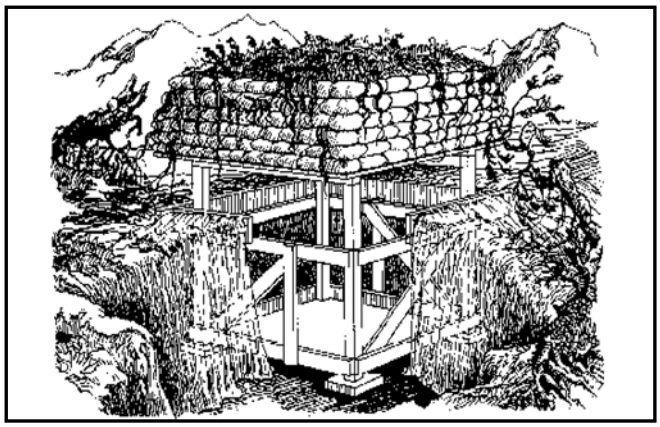

Figure 1

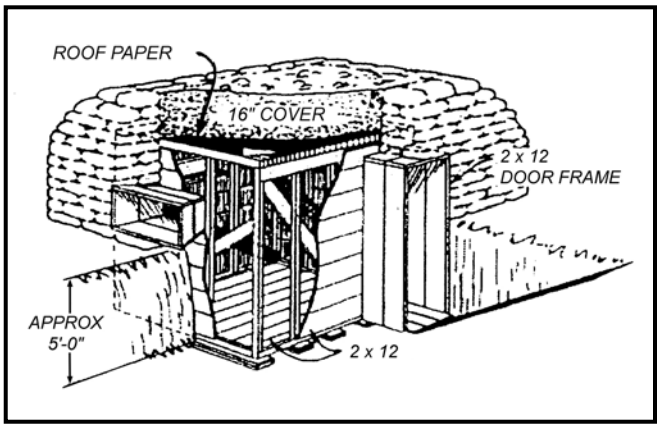

Figure 2

also lacks sufficient overhead cover, and the stringers appear to be too few and too far apart. The center column, along with the 4"x4" post at the right of the photograph, appears to have been added after the position was built, probably because the roof was sagging. It is too short and has been propped up on two sandbags, a totally inadequate footing. This column also would interfere with the soldier if he tried to engage targets from the oversized openings.

The selection, number, and placement of the stringers supporting overhead cover is critical to the safety of a position. Weak stringers, placed too far apart, simply cannot carry the load.

Another key factor is the strength and location of the support base on which the stringers rest. If the base is too weak, or too close to the edge, the sides of the position will slump inward, possibly suffocating the occupants before they can be dug out.

Do not be intimidated by all of this talk of construction standards, footings, timbers, stringers, and spacing. It is not technical information that can be understood only by an engineer. This is simple soldier-skill stuff, and infantrymen have been building good, solid positions since before World War I.

Every soldier and every leader, combat arms or not, must know this. Supervising the construction of fighting positions is one of the fundamental tasks of a noncommissioned officer. It has to be done to standard, because the lives of soldiers and the success of the mission depend on it. Learn how to inspect a fighting position. If you do, you will never have to dig the lifeless body of a soldier out of one that collapsed on him.

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M41 TOW

Improved Target Acquisition System (ITAS)

LIEUTENANT COLONEL CRAIG G. LANGHAUSER

The M41 TOW improved target acquisition system (ITAS) is a block upgrade to the M220 ground/high-mobility multipurpose wheeled vehicle (HMMWV)-mounted TOW 2 missile system. The TOW ITAS is currently being fielded to airborne, air assault, and light infantry forces throughout the active and reserve components of the U.S. Army. The ITAS, in addition to providing better antiarmor capabilities to antitank units, also has capabilities that make it an integral part of the combined arms team. Even when organized in heavy–light task forces, where the preponderance of antiarmor capabilities traditionally has resided in the heavy elements, TOW ITAS-equipped antitank units can not only destroy threat targets but also provide superior reconnaissance, surveillance, and target acquisition (RSTA), rear area protection, and urban operations capabilities.

The TOW ITAS consists of three new line replaceable units: the target acquisition subsystem (TAS), the fire control subsystem, and the battery power source; a modified TOW 2 traversing unit; the existing TOW launch tube and tripod; and a TOW HMMWV modifi-

cation kit. The TAS integrates into a single housing the direct view optics, a second-generation forward looking infrared (FLIR) night vision sight (NVS), missile trackers, and a laser range finder. TAS electronics provide automatic boresighting for these components, eliminating both tactical collimation and 180-day verification requirements.

The fire control subsystem, which is the system's brain, contains the software that controls the missile flight, the aided target tracker, passive ranging, and NVS zoom. The tracker enables the gunner to lock onto the thermal image of a target by properly sizing "track gates" on the target. The tracker will cause the missile to fly to the center of mass within the track gates during the brief period of target obscuration after missile launch. These track gates can be used to determine the approximate range to a target on the basis of standard target form sizes. The fire control system also contains the embedded training circuitry for sustainment training, and advanced built-in test/built-in test equipment (BIT/BITE), which provides fault detection and isolation for both operator and direct-support maintenance.

The battery power source gives TOW ITAS a ten-hour dismount capability, a power conditioner for on-vehicle power, and an AC/DC battery charger. The modified traversing unit has an elevation brake to reduce launch transients, and improved "pistol grip" handgrips/controls that provide improved ergonomics. Controls on the left handgrip are for sight select, menu control, field of view and brightness, contrast, and focus. The right handgrip switches control track gate initiation, activating, adjusting, and locking the track gates on a target, ranging the target, and firing the missile. The TOW ITAS fires all existing TOW missile versions and its digital architecture gives it the growth capability to accept future missiles such as the TOW fire-and-forget, the TOW bunker buster, common missile, and compact kinetic energy missile.

After the long-range advanced scout surveillance system (LRAS3), the TOW ITAS is the best RSTA device in the U.S. Army inventory. The second generation FLIR NVS with 24-power digital zoom provides more than twice the detection, recognition, and identification ranges of the TOW 2 in moderate weather conditions. The TOW ITAS offers even greater advantages in harsher weather conditions. During a recent National Training Center (NTC) rotation, 82d Airborne Division soldiers could see movement beyond 10 kilometers, distinguish between tracked and wheeled vehicles at eight kilometers, and identify vehicle types and dismounts at five kilometers. The brigade combat team (BCT) commander used this capability to determine the disposition and intent of the opposing force (OPFOR). In thick vegetation, such as that at the Joint Readiness Training Center (JRTC), soldiers have been able to acquire targets, and again determine the OPFOR's intent. In both cases, the units equipped with the TOW ITAS gathered the priority intelligence requirements to set the tone of the battle to come.

The battery power source will power the TOW ITAS for ten hours of dismounted operations or ten hours of silent watch beyond the capability of the HMMWV battery. Coupled with the extremely silent NVS cooler, the TOW ITAS truly has a silent watch capability that makes it impossible to detect with the unaided ear.

Upon target acquisition, soldiers can use the ranging capabilities of the TOW ITAS to determine target locations beyond the direct-fire weapons' range of any infantry or armor battalion, and relay them to the fire support element for engagement with indirect fire support. This is essential to winning the counterreconnaissance battle. During the first TOW ITAS-equipped JRTC rotation, soldiers mounted an AN/PAQ-4A/C infrared aiming light on the TOW ITAS. Once the OPFOR came within range of the M2HB .50 caliber machinegun and the Mk 19 grenade launcher, the gunners used the TAS-mounted PAQ-4s to designate targets for their platoon mates to engage. The gunners were also able to designate targets for the OH-58D Kiowa Warriors. The TOW ITAS enabled the brigade task force to win the counterreconnaissance battle without firing a single missile.

The HMMWV provides excellent mobility throughout "rear areas." During an NTC rotation, a HMMWV that was back in the BSA for vehicle maintenance destroyed a lone attacking BMP less than four minutes after a soldier noticed the HMMWV and climbed up on it and powered up the system.

Urban terrain is not traditionally a good environment in which to employ an antiarmor system. The fire control software, though, enables the gunner to fire a TOW 2B missile and guide it line-of-sight to the target. The gunner can literally fly the missile into a window or door to attack a target within a building. Development will soon start on the TOW bunker buster missile, which will make at least a 24-inch diameter hole in a double reinforced eight-inch concrete wall, and provide a breach point for dismounted infantry to enter a building.

When it comes to putting a missile on target, the TOW ITAS offers a vastly improved probability of hit over that of the ground TOW. The first TOW ITAS units have achieved more than a 90 percent hit rate after firing more than 300 missiles. All targets were farther away than 1800 meters, with most of them between 2500 and 3750 meters, both moving and stationary. Many gunners had just completed advanced individual training and had not attended new equipment training with their unit or received TOW ITAS training at Fort Benning. Some of these soldiers trained less than three hours at the range before launching their first missiles. The TOW ITAS's embedded training and improved ergonomics facilitated the rapid training.

A single platoon from an airborne D Company attached to a balanced, heavy brigade task force at the NTC was credited with destroying 20 vehicles of an attacking motorized rifle regiment. Needless to say, the brigade defeated the regiment.

A central design tenet of the TOW ITAS was to reduce required maintenance actions and increase system reliability and availability. This is accomplished through the reduction of the

number of components from 18 to six, compared to the TOW 2, and a modular design that requires no special tools. The BIT/BITE fault isolates to a specific component and eliminates the need for organizational test equipment. The built-in automatic boresight eliminates the 180-day verification test requirement. The only scheduled maintenance action is to replace the BPS batteries at the end of their useful life.

The TRADOC System Manager, Close Combat Missile Systems, and the Close Combat Missile Systems (CCMS) Project Office, are continually working to improve the TOW ITAS. Funded improvements include: a vehicle commander's display for viewing the TAS thermal image, a TAS mount for either the AN/PAQ-4A/C infrared aiming light or AN/PEQ-2A target pointer/illuminator, an improved FCS that will enable the incorporation of enhanced target tracking, and a lithium (Li) Ion BPS. The Li Ion BPS uses the state-of-the-art technology of the electric vehicle battery and will reduce BPS weight, provide longer silent watch, faster recharge times, and a greater useful life. By the end of 2002, the CCMS Project Office also plans to demonstrate the versatility of the TOW ITAS by firing a Javelin missile.

A modified version of the TOW ITAS will be used on the antitank guided missile (ATGM) variant of the interim combat vehicle (ICV) for the interim brigade combat team (IBCT). Modifications will be made to mount TOW ITAS components in a turret, remote the video into the vehicle, and accommodate a dual-tube launcher. This system will provide the medium force with all the capabilities the TOW ITAS-equipped light infantry now has. The TOW ITAS and the LRAS3 are the only second generation FLIR systems in the IBCT; as a result, the ATGM company will find itself assigned many key roles to support IBCT operations.

The TOW ITAS provides the Army's light and medium forces many of the same capabilities currently being fielded on the M2A3 in the heavy counterattack corps at Fort Hood, Texas. Threats, simulated or real, should beware of the immense capabilities TOW ITAS equipped units have to detect, recognize, and identify potential targets and the multitude of ground and air systems that can be summoned to respond.

Lieutenant Colonel Craig G. Langhauser is the Product Manager, Advanced TOW Acquisition Systems, which includes the M41 ITAS and the Improved Bradley Acquisition Subsystem (IBAS) on the M2A3 Bradley. He is a 1982 graduate of the United States Military Academy and holds a master's degree from the University of Maryland, University College.

Get Volcano Mines Into the Fight

COLONEL THOMAS K. LITTLEFIELD, JR.

According to Field Manual (FM) 20-32, *obstacle emplacement authority* is the jurisdiction that a unit commander has to emplace tactical obstacles. In a theater of operations, theater commanders have the authority to emplace obstacles. In most cases they delegate this authority to corps commanders who further delegate it to division commanders. Division commanders then have obstacle emplacement authority in their area of operations, unless that authority is withheld or restricted by a higher commander. Commanders subordinate to corps and division do not have the authority to emplace obstacles unless the higher commander delegates it for a current operation.

During my time as a combat engineer commander and staff member, I have had difficulty getting authority for using our organic Volcano systems. Often we can get authority for four-hour duration mines. The problem comes when we request 48-hour or 15-day duration mines. I have occasionally received 48-hour permission, but never 15-day permission. At the same time, I have had permission to use conventional hand-emplaced mines that cannot have a self-destruct capability. These are armed and deadly until removed or destroyed.

Why is permission to use a temporary mine denied while permission to use a permanent mine is routinely granted? The normal reasons that I have been given for denial are concerns about fratricide and constraining future maneuver. Both of these concerns can be mitigated. Before any land Volcano System can be used to emplace a minefield, fratricide prevention fences must be erected, just like those used for conventional hand-emplaced minefields.

The future maneuver concerns can be mitigated with the use of lanes. Lanes can be left in the Volcano minefield, and they can be closed with Modular Pack Mine Systems (MOPMS). They can also be opened with the self-destruct feature of the MOPMS.

As we move to the future we must get used to replacing conventional hand-emplaced mines with scatterable mines. We need to do this for three primary reasons—reduced logistical requirements, faster emplacement times, and smaller manpower requirements.

From a logistical viewpoint, a Volcano antitank mine weighs about four pounds, as opposed to the conventional M-15's 30 pounds. This is more than an 85 percent reduction in weight for countermobility logistical requirements. Two soldiers with one vehicle can emplace a 1,000-meter minefield in about